

**PCT**

**NOTIFICATION OF ELECTION**

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

<b>Date of mailing (day/month/year)</b> 11 August 2000 (11.08.00)	
<b>International application No.</b> PCT/IB99/02076	<b>Applicant's or agent's file reference</b> 101009/PRS
<b>International filing date (day/month/year)</b> 13 December 1999 (13.12.99)	<b>Priority date (day/month/year)</b> 14 December 1998 (14.12.98)
<b>Applicant</b> STAACK, Jens et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

27 June 2000 (27.06.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<b>The International Bureau of WIPO</b> 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No.: (41-22) 740.14.35	<b>Authorized officer</b>  Pascal Piriou  Telephone No.: (41-22) 338.83.38
--	--

PCT

For Receiving Office use only

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference

(if desired) (12 characters maximum) 101009/PRS

## Box No. I TITLE OF INVENTION

LOCATING SYSTEM FOR MOBILE STATIONS

## Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

NOKIA NETWORKS OY  
Keilalahdentie 4  
02150 Espoo  
Finland

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:  
Finland (FI)

State (that is, country) of residence:  
Finland (FI)

This person is applicant  
for the purposes of:

☐ all designated States☒ all designated States except the United States of America☐ the United States of America only☐ the States indicated in the Supplemental Box

## Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

STAACK; Jens  
c/o Nokia Networks Oy  
Keilalahdentie 4  
02150 Espoo  
Finland

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:  
Finland (FI)

State (that is, country) of residence:  
Finland (FI)

This person is applicant  
for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

## Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

Philip Roy SLINGSBY  
Page White & Farrer  
54 Doughty Street  
London WC1N 2LS  
United Kingdom

Telephone No.

0171 831 7929

Facsimile No.

0171 831 8040

Teleprinter No.

8955681

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

## Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

*If none of the following sub-boxes is used, this sheet should not be included in the request.*

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

SIVALINGAM; Kengatharan  
c/o Nokia Networks Oy  
Keilalahdentie 4  
02150 Espoo  
Finland

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

Finland (FI)

State (that is, country) of residence:

Finland (FI)

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☒ the United States of America only

☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

TUHKALAINEN; Timo  
Jokitie 20 A 2  
00780 Helsinki  
Finland

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

Finland (FI)

State (that is, country) of residence:

Finland (FI)

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☒ the United States of America only

☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

☐ applicant only

☐ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

☐ applicant only

☐ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

## Box No.V DESIGNATION STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

## Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....

## National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> AE United Arab Emirates                  | <input checked="" type="checkbox"/> LR Liberia                                   |
| <input checked="" type="checkbox"/> AL Albania                               | <input checked="" type="checkbox"/> LS Lesotho                                   |
| <input checked="" type="checkbox"/> AM Armenia                               | <input checked="" type="checkbox"/> LT Lithuania                                 |
| <input checked="" type="checkbox"/> AT Austria                               | <input checked="" type="checkbox"/> LU Luxembourg                                |
| <input checked="" type="checkbox"/> AU Australia                             | <input checked="" type="checkbox"/> LV Latvia                                    |
| <input checked="" type="checkbox"/> AZ Azerbaijan                            | <input checked="" type="checkbox"/> MD Republic of Moldova                       |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina                | <input checked="" type="checkbox"/> MG Madagascar                                |
| <input checked="" type="checkbox"/> BB Barbados                              | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BG Bulgaria                              | <input checked="" type="checkbox"/> MN Mongolia                                  |
| <input checked="" type="checkbox"/> BR Brazil                                | <input checked="" type="checkbox"/> MW Malawi                                    |
| <input checked="" type="checkbox"/> BY Belarus                               | <input checked="" type="checkbox"/> MX Mexico                                    |
| <input checked="" type="checkbox"/> CA Canada                                | <input checked="" type="checkbox"/> NO Norway                                    |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein  | <input checked="" type="checkbox"/> NZ New Zealand                               |
| <input checked="" type="checkbox"/> CN China                                 | <input checked="" type="checkbox"/> PL Poland                                    |
| <input checked="" type="checkbox"/> CU Cuba                                  | <input checked="" type="checkbox"/> PT Portugal                                  |
| <input checked="" type="checkbox"/> CZ Czech Republic                        | <input checked="" type="checkbox"/> RO Romania                                   |
| <input checked="" type="checkbox"/> DE Germany                               | <input checked="" type="checkbox"/> RU Russian Federation                        |
| <input checked="" type="checkbox"/> DK Denmark                               | <input checked="" type="checkbox"/> SD Sudan                                     |
| <input checked="" type="checkbox"/> EE Estonia                               | <input checked="" type="checkbox"/> SE Sweden                                    |
| <input checked="" type="checkbox"/> ES Spain                                 | <input checked="" type="checkbox"/> SG Singapore                                 |
| <input checked="" type="checkbox"/> FI Finland                               | <input checked="" type="checkbox"/> SI Slovenia                                  |
| <input checked="" type="checkbox"/> GB United Kingdom                        | <input checked="" type="checkbox"/> SK Slovakia                                  |
| <input checked="" type="checkbox"/> GD Grenada                               | <input checked="" type="checkbox"/> SL Sierra Leone                              |
| <input checked="" type="checkbox"/> GE Georgia                               | <input checked="" type="checkbox"/> TJ Tajikistan                                |
| <input checked="" type="checkbox"/> GH Ghana                                 | <input checked="" type="checkbox"/> TM Turkmenistan                              |
| <input checked="" type="checkbox"/> GM Gambia                                | <input checked="" type="checkbox"/> TR Turkey                                    |
| <input checked="" type="checkbox"/> HR Croatia                               | <input checked="" type="checkbox"/> TT Trinidad and Tobago                       |
| <input checked="" type="checkbox"/> HU Hungary                               | <input checked="" type="checkbox"/> UA Ukraine                                   |
| <input checked="" type="checkbox"/> ID Indonesia                             | <input checked="" type="checkbox"/> UG Uganda                                    |
| <input checked="" type="checkbox"/> IL Israel                                | <input checked="" type="checkbox"/> US United States of America                  |
| <input checked="" type="checkbox"/> IN India                                 | <input checked="" type="checkbox"/> UZ Uzbekistan                                |
| <input checked="" type="checkbox"/> IS Iceland                               | <input checked="" type="checkbox"/> VN Viet Nam                                  |
| <input checked="" type="checkbox"/> JP Japan                                 | <input checked="" type="checkbox"/> YU Yugoslavia                                |
| <input checked="" type="checkbox"/> KE Kenya                                 | <input checked="" type="checkbox"/> ZA South Africa                              |
| <input checked="" type="checkbox"/> KG Kyrgyzstan                            | <input checked="" type="checkbox"/> ZW Zimbabwe                                  |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea |  |
| <input checked="" type="checkbox"/> KR Republic of Korea                     |  |
| <input checked="" type="checkbox"/> KZ Kazakhstan                            |  |
| <input checked="" type="checkbox"/> LC Saint Lucia                           |  |
| <input checked="" type="checkbox"/> LK Sri Lanka                             |  |

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- ☒ CR Costa Rica; ☒ DM Dominica; ☒ Tanzania; ☒ Morocco

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

**Supplemental Box**      *If the Supplemental Box is not used, this sheet should not be included in the request.*

1. If, in any of the Boxes, the space is insufficient to furnish all the information: in such case, write "Continuation of Box No. ..." [indicate the number of the Box] and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:
  - (i) if more than two persons are involved as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;
  - (ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;
  - (iii) if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
  - (iv) if, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
  - (v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
  - (vi) if, in Box No. VI, there are more than three earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI;
  - (vii) if, in Box No. VI, the earlier application is an ARIPO application: in such case, write "Continuation of Box No. VI", specify the number of the item corresponding to that earlier application and indicate at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed.
2. If, with regard to the precautionary designation statement contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.
3. If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning non-prejudicial disclosures or exceptions to lack of novelty: in such case, write "Statement concerning non-prejudicial disclosures or exceptions to lack of novelty" and furnish that statement below.

Continuation of Box No. IV  
Agents continued

PALMER; Roger (GB)  
 RICHARDS; David John (GB)  
 JENKINS; Peter David (GB)  
 DRIVER; Virginia Rozanne (GB)  
 DANIELS; Jeffrey Nicholas (GB)  
 STYLE; Kelda Camilla Karen (GB)  
 NEOBARD; William John (GB)  
 SHACKLETON; Nicola (GB)  
 HILL; Christopher Michael (GB)  
 RUUSKANEN; Juha-Pekka (FI)

all of: Page White & Farrer  
 54 Doughty Street  
 London WC1N 2LS  
 United Kingdom

Tel: 0171 831 7929

Fax: 0171 831 8040

Telex: 8955681

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	When earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) 14 December 1998 (14.12.98)	9827505.0	GB		
item (2) 17 November 1999 (17.11.99)	9927207.2	GB		
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): (1) and (2)

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

## Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):	Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):
ISA/	Date (day/month/year)      Number      Country (or regional Office)

## Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets: request : 5 description (excluding sequence listing part) : 15 claims : 4 abstract : 1 drawings : 7 sequence listing part of description : Total number of sheets : 32	This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input checked="" type="checkbox"/> other (specify): FORM 23/77
Figure of the drawings which should accompany the abstract: 2	Language of filing of the international application: English

## Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Philip Roy SLINGSBY - Authorised Representative

For receiving Office use only		2. Drawings:  <input type="checkbox"/> received:  <input type="checkbox"/> not received:
1. Date of actual receipt of the purported international application:		
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		
4. Date of timely receipt of the required corrections under PCT Article 11(2):		
5. International Searching Authority (if two or more are competent): ISA/	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.	

For International Bureau use only
Date of receipt of the record copy by the International Bureau:

# PATENT COOPERATION TREATY

From the:  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

## PCT

### WRITTEN OPINION

(PCT Rule 66)

To:

SLINGSBY, Philip Roy  
PAGE WHITE & FARRER  
54 Doughty Street  
LONDON WC1N 2LS  
GRANDE BRETAGNE

**RECEIVED**  
**25 SEP 2000**  
Ans a.....

Date of mailing  
(day/month/year)

22.09.2000

Applicant's or agent's file reference

101009/PRS

**REPLY DUE**

**within 3 month(s)**  
from the above date of mailing

International application No.

PCT/IB99/02076

International filing date (day/month/year)

13/12/1999

Priority date (day/month/year)

14/12/1998

International Patent Classification (IPC) or both national classification and IPC

G01S5/02

Applicant

NOKIA NETWORKS OY et al.

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
  - I ☒ Basis of the opinion
  - II ☐ Priority
  - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV ☒ Lack of unity of invention
  - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - VI ☐ Certain document cited
  - VII ☒ Certain defects in the international application
  - VIII ☒ Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.
 

**When?** See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

**How?** By-submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

**Also:** For an additional opportunity to submit amendments, see Rule 66.4.  
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.  
For an informal communication with the examiner, see Rule 66.6.

**If no reply is filed,** the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: **14/04/2001**.

Name and mailing address of the international preliminary examining authority:



European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized officer / Examiner

Fanjul Caudevilla, J

Formalities officer (incl. extension of time limits)

Kellerer, C

Telephone No. +49 89 2399 2261



**I. Basis of the opinion**

1. This opinion has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".*):

**Description, pages:**

1-15 as originally filed

**Claims, No.:**

1-25 as originally filed

**Drawings, sheets:**

1/7-7/7 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**IV. Lack of unity of invention**

1. In response to the invitation (Form PCT/IPEA/405) to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.  
☐ paid additional fees.  
☐ paid additional fees under protest.  
☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied with for the following reasons



## WRITTEN OPINION

International application No. PCT/IB99/02076

and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees:

**see separate sheet**

3. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this opinion:

☒ all parts..

☐ the parts relating to claims Nos. .

### V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

#### 1. Statement

Novelty (N)	Claims	1
Inventive step (IS)	Claims	2-25
Industrial applicability (IA)	Claims	

#### 2. Citations and explanations

**see separate sheet**

### VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

### VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item IV**

**Lack of unity of invention**

The separate inventions are:

1. Claims 1, 10. Estimating the location of a mobile unit based upon information identifying the cell, the distance of the mobile to the base station and bearing information associated to the cell.
2. Claims 14, 20. Reporting the location of a mobile unit in a cellular radio system based upon information identifying the cell, the distance of the mobile to the base station, and descriptive information associated with the distance of the mobile from the base station.
3. Claim 24. Reporting on the location of a first mobile station, at the request of a second mobile station, the report being transmitted by means of the wireless application protocol.

They are not so linked as to form a single general inventive concept (Rule 13.1 PCT), since a technical relationship involving one or more of the same or corresponding special technical features in the sense of Rule 13.2 PCT does not exist between the subject-matter of the three groups of claims above, for the following reasons:

The **common** concept linking together the groups of claims (1) and (2) above is that information on the **cell** and **distance of the mobile to the base station** is used for the estimation of the location of the mobile. This common concept is not novel (see the grounds for this objection under item V).

Regarding claim 24, the **common** concept linking this claim to the other groups of claims (1) and (2) above, is the generation of a report on the location of a mobile station, once this **location is estimated** (by any means). This common concept is not novel (see the grounds for this objection under item V).

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

- D1: WO 97 17623 A (BORUNDI INTERNATIONAL PTY LTD) 15 May 1997 (1997-05-15)  
D2: WO 98 00988 A (ERICSSON GE MOBILE INC) 8 January 1998 (1998-01-08)  
D3: WO 98 29758 A (KSI INC) 9 July 1998 (1998-07-09)  
D4: US-A-5 485 163 (KOBINETZ ANTHONY ET AL) 16 January 1996 (1996-01-16)  
D5: WO 95 27219 A (MOTOROLA INC) 12 October 1995 (1995-10-12)

2. The solution proposed in claims **1** and **10** of the present application cannot be considered novel (Article 33(2) PCT) for the following reasons:

Document **D1**, which is considered to be the closest prior art, discloses a "method for estimating the location of a mobile unit in a cellular radio system (page **1**, lines **1-5**), comprising:

identifying a cell of the system in which the mobile unit is located (page **2**, lines **29-31**);  
estimating the distance of the mobile unit from the base station of the cell (page **3**, lines **10-12**);  
determining the location of the base station (page **2**, lines **29-31**);  
determining the bearing information associated with the cell, the bearing information defining a direction (page **2**, line **31** to page **3**, line **2**); and  
calculating a location offset from the base station by the said distance in the said direction to estimate the location of the mobile unit (page **6**, lines **8-11**)."

All the technical features of independent claim **1** (method) and **10** (system) are anticipated in **D1**.

3. Dependent claims **2-9** and **11-13** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of novelty and inventive step. They are either known from the prior art or they are considered to be common design measures within the normal range of options envisaged by a person skilled in this art.

Claims 2-3 and 11-12. The estimation of the location of the mobile unit based solely upon the location of the base station is disclosed in **D4** (column 2, lines 57-60)

Claims 4-6. The technical features of these claims are disclosed in **D1** (page 2, line 30 to page 3, line 14)

Claims 7-8 and 13. The steps of sending and receiving a location related message to and by the mobile station are disclosed in **D2** (abstract, lines 1-2).

Claim 9. The calculation of the route to the mobile station is disclosed in **D3** (page 14, lines 13-15).

4. The solution proposed in claims **14** and **20** of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Document **D3** discloses the use of descriptive information ("collateral information") in combination with timing and directional data for determining the position of a transceiver (page 14, lines 10-27). It would be evident for the skilled person to use the procedure of **D3**, based upon the descriptive information, in combination with the method for estimating the location of a mobile unit of **D1**, based upon the use of cell and distance information, arriving to the subject matter of claim **14**.

This immediate combination does not involve an inventive step.

Regarding the location request, translation and response means of claim **20**, they are disclosed in **D3** (page **15**, lines **1-27**).

5. Dependent claims **15-19** and **21-23** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of novelty and inventive step. They are either known from the prior art or they are considered to be common design measures within the normal range of options envisaged by a person skilled in this art.

Claims **15-16**. The use of place name and road name information is disclosed in **D3** (page **15**, lines **10-18**)

Claims **17, 19, 22**. The use of the wireless application protocol to request and transmit information on the location of the mobile, does not imply any new technical effect, involving only the normal use of that protocol. This protocol would be chosen by the skilled person, in accordance with circumstances, without the exercise of inventive skill.

Claim **18**. The means for accepting the request from a second mobile unit, are disclosed in **D2** (see figure **1**, **(10)** and **(50)**)

Claims **21-23**. The features of these claims are considered to be design options, that can be implemented by the skilled person without the exercise of inventive skill.

6. The solution proposed in claims **24** and **25** of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

All the steps of the method in claim **24** are disclosed in **D2** (see abstract, lines **1-4**, and figure **1**). The use of the wireless application protocol to request and report

information on the location of the mobile, does not imply any new technical effect, involving only the normal use of that protocol. This protocol would be chosen by the skilled person, in accordance with circumstances, without the exercise of inventive skill.

**Re Item VII**

**Certain defects in the international application**

1. Independent claims **1, 10, 14, 20** and **24** are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
3. To meet the requirements of Rule 5.1 a) ii) PCT, the documents **D1- D4** should be identified in the description and the relevant background art disclosed therein should be briefly discussed.

**Re Item VIII**

**Certain observations on the international application**

1. The following terms used throughout the claims are vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer (Article 6 PCT):
  - a) The terms "cell of a first type" and "cell of a second type" should be replaced, for example, by "elongated cells" and "non-elongated cells". according to the description of these terms provided on page 8.

**WRITTEN OPINION  
SEPARATE SHEET**

---

International application No. PCT/IB99/02076

- b) The term "descriptive information" of claim 14, should be further defined, for example, making reference to "geographical information".
- c) The term "mobile location centre" of claim 23 should be further defined.

# PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

## NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

SLINGSBY, Philip, Roy  
Page White & Farrer  
54 Doughty Street  
London WC1N 2LS  
ROYAUME-UNI

RECEIVED

30 JUN 2000

AMS 00000000000000000000

Date of mailing (day/month/year) 22 June 2000 (22.06.00)		IMPORTANT NOTICE	
Applicant's or agent's file reference 101009/PRS			
International application No. PCT/IB99/02076	International filing date (day/month/year) 13 December 1999 (13.12.99)	Priority date (day/month/year) 14 December 1998 (14.12.98)	
Applicant NOKIA NETWORKS OY et al			

- 1: Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:  
AU,CN,JP,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:  
AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CR,CU,CZ,DE,DK,DM,EA,EE,EP,ES,FI,GB,GD,GE,  
GH,GM,HR,HU,ID,IL,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,NO,NZ,  
OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW  
The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).
3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on  
22 June 2000 (22.06.00) under No. WO 00/36430

### REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

### REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer J. Zahra Telephone No. (41-22) 338.83.38
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The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ \_\_\_\_\_

# PCT

## CHAPTER II

### DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND	
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference 101009/PRS	
International application No. PCT/IB99/02076	International filing date (day/month/year) 13 December 1999 (13.12.99)	(Earliest) Priority date (day/month/year) 14 December 1998 (14.12.98)	
Title of invention LOCATION SYSTEM FOR MOBILE USERS			
Box No. II APPLICANT(S)			
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) NOKIA NETWORKS OY Keilalahdentie 4 FIN-02150 Espoo Finland		Telephone No.:	
		Facsimile No.:	
		Teleprinter No.:	
State (that is, country) of nationality: Finland (FI)		State (that is, country) of residence: Finland (FI)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) STAACK; Jens Klaneettitie 12 D 54 FIN-00420 Helsinki Finland			
State (that is, country) of nationality: Finland (FI)		State (that is, country) of residence: Finland (FI)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) SIVALINGAM; Kengatharan Ulvilantie 8 C 34 FIN-00350 Helsinki Finland			
State (that is, country) of nationality: Finland (FI)		State (that is, country) of residence: Finland (FI)	
<input checked="" type="checkbox"/> Further applicants are indicated on a continuation sheet.			

Continuation of Box No. II APPLICANT(S)

*If none of the following sub-boxes is used, this sheet should not be included in the demand.*

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

TUHKALAINEN; Timo  
Jokitie 20 A 2  
FIN-00780. Helsinki  
Finland

State (that is, country) of nationality:

Finland (FI)

State (that is, country) of residence:

Finland (FI)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:



Further applicants are indicated on another continuation sheet.

**Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The following person is ☒ agent ☐ common representative  
 and ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.  
☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.  
☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

SLINGSBY; Philip Roy  
 Page White & Farrer  
 54 Doughty Street  
 London WC1N 2LS  
 United Kingdom

Telephone No.:

020 7831 7929

Facsimile No.:

020 7831 8040

Teleprinter No.:

8955681

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:\***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed

the description ☒ as originally filed  
☐ as amended under Article 34

the claims ☒ as originally filed  
☐ as amended under Article 19 (together with any accompanying statement)  
☐ as amended under Article 34

the drawings ☒ as originally filed  
☐ as amended under Article 34

2. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.

3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

\* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English

☒ which is the language in which the international application was filed.

☐ which is the language of a translation furnished for the purposes of international search.

☐ which is the language of publication of the international application.

☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

**Box No. V ELECTION OF STATES**

The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

## Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- |  |   |   |        |
|--|---|---|--------|
| 1. translation of international application                              | : |   | sheets |
| 2. amendments under Article 34   | : |   | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : |   | sheets |
| 4. copy (or, where required, translation) of statement under Article 19  | : |   | sheets |
| 5. letter  | : | 1 | sheets |
| 6. other ( <i>specify</i> )  | : |   | sheets |

For International Preliminary Examining Authority use only

received                      not received

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- |  |   |
|--|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet                             | 4. <input type="checkbox"/> statement explaining lack of signature                                  |
| 2. <input type="checkbox"/> separate signed power of attorney                            | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any; | 6. <input type="checkbox"/> other ( <i>specify</i> ):   |

## Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

SLINGSBY; Philip Roy - Authorised Representative

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.

☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

SLINGSBY, Philip Roy  
PAGE WHITE & FARRER  
54 Doughty Street  
LONDON WC1N 2LS  
GRANDE BRETAGNE

RECEIVED  
- 8 FEB 2001  
Ans'd

## PCT

### NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Rule 71.1)

Date of mailing  
(day/month/year)

05.12.01

Applicant's or agent's file reference  
101009/PRS

#### IMPORTANT NOTIFICATION

International application No.  
PCT/IB99/02076

International filing date (day/month/year)  
13/12/1999

Priority date (day/month/year)  
14/12/1998

Applicant  
NOKIA NETWORKS OY et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

#### 4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4400

Authorized officer

Kellerer, C

Tel. +49 89 2399-2261



# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 101009/PRS		FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/IB99/02076	International filing date (day/month/year) 13/12/1999	Priority date (day/month/year) 14/12/1998	
International Patent Classification (IPC) or national classification and IPC G01S5/02			
Applicant NOKIA NETWORKS OY et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 10 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  27/06/2000	Date of completion of this report  13.02.01.
Name and mailing address of the International preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 4465	Authorized officer  Fanjul Caudevilla, J.   Telephone No. +49 89 2399 2533

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IB99/02076

**I. Basis of the report**

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:

**Description, pages:**

1-15 as originally filed

**Claims, No.:**

1-23 with telefax of 19/01/2001

**Drawings, sheets:**

1/7-7/7 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IB99/02076

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**IV. Lack of unity of invention**

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.  
☐ paid additional fees.  
☐ paid additional fees under protest.  
☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.  
☒ not complied with for the following reasons:  
**see separate sheet**

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.  
☐ the parts relating to claims Nos. .

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims 1-19, 21-23
	No: Claims 20
Inventive step (IS)	Yes: Claims
	No: Claims 1-23



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IB99/02076

Industrial applicability (IA)    Yes:    Claims    1-23  
   No:    Claims

2. Citations and explanations  
**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**Re Item IV**

**Lack of unity of invention**

The separate inventions are:

1. Claims 1, 8. Estimating the location of a mobile unit based upon information identifying the cell, the distance of the mobile to the base station and bearing information associated to the cell.
2. Claims 10, 16. Reporting the location of a mobile unit in a cellular radio system based upon information identifying the cell, the distance of the mobile to the base station, and descriptive information associated with the distance of the mobile from the base station.
3. Claim 20. Reporting on the location of a first mobile station, at the request of a second mobile station, the report being transmitted by means of the wireless application protocol.

They are not so linked as to form a single general inventive concept (Rule 13.1 PCT), since a technical relationship involving one or more of the same or corresponding special technical features in the sense of Rule 13.2 PCT does not exist between the subject-matter of the three groups of claims above, for the following reasons:

The **common** concept linking together the groups of claims (1) and (2) above is that information on the **cell** and **distance of the mobile to the base station** is used for the estimation of the location of the mobile. This common concept is not novel (see the grounds for this objection under item V).

Regarding claim 20, the **common** concept linking this claim to the other groups of claims (1) and (2) above, is the generation of a report on the location of a mobile station, once this **location is estimated** (by any means). This common concept is not novel (see the grounds for this objection under item V).

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

---

International application No. PCT/IB99/02076

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

- D1: WO 97 17623 A (BORUNDI INTERNATIONAL PTY LTD) 15 May 1997 (1997-05-15)
- D2: WO 98 00988 A (ERICSSON GE MOBILE INC) 8 January 1998 (1998-01-08)
- D3: WO 98 29758 A (KSI INC) 9 July 1998 (1998-07-09)
- D4: US-A-5 485 163 (KOBINETZ ANTHONY ET AL) 16 January 1996 (1996-01-16)
- D5: WO 95 27219 A (MOTOROLA INC) 12 October 1995 (1995-10-12)

2. The solution proposed in claims **1** and **8** of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons.

Document **D1**, which is considered to be the closest prior art, discloses a "method for estimating the location of a mobile unit in a cellular radio system (page **1**, lines **1-5**), comprising:

- identifying a cell of the system in which the mobile unit is located (page **2**, lines **29-31**);
- estimating the distance of the mobile unit from the base station of the cell (page **3**, lines **10-12**);
- determining the location of the base station (page **2**, lines **29-31**);
- determining the bearing information associated with the cell, the bearing information defining a direction (page **2**, line **31** to page **3**, line **2**); and
- calculating a location offset from the base station by the said distance in the said direction to estimate the location of the mobile unit (page **6**, lines **8-11**)."

The problem to be solved by the present invention may therefore be regarded as how to modify the method of **D1** for the estimation of the location of the mobile system comprising also "non-elongated" cells. The solution to such a problem is disclosed in **D4**. This latter document proposes that in the case of small cells, the estimation of the location of the mobile unit is based solely upon the location of the base station (see column 2, lines 57-60). The skilled person would apply the teaching of **D4** when the mobile network includes non-ellongated cells, arriving to the method and system defined in claims 1 and 8 without exercising any inventive step (Article 33(3) PCT).

3. Dependent claims 2-7 and 9 do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of novelty and inventive step.
  - Claims 2-4. The technical features of these claims are disclosed in **D1** (page 2, line 30 to page 3, line 14).
  - Claims 5-6 and 9. The steps of sending and receiving a location related message to and by the mobile station are disclosed in **D2** (abstract, lines 1-2).
  - Claim 7. The calculation of the route to the mobile station is disclosed in **D3** (page 14, lines 13-15).
4. The solution proposed in claims 10 and 16 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Document **D3** discloses the use of descriptive information ("collateral information") in combination with timing and directional data for determining the position of a transceiver (page 14, lines 10-27). It would be evident for the skilled person to use the procedure of **D3**, based upon the descriptive information, in combination

with the method for estimating the location of a mobile unit of **D1**, based upon the use of cell and distance information, arriving to the subject matter of claim **10**. This immediate combination does not involve an inventive step.

Regarding the location request, translation and response means of claim **16**, they are disclosed in **D3** (page **15**, lines **1-27**).

5. Dependent claims **11-15** and **17-19** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of novelty and inventive step. They are either known from the prior art or they are considered to be common design measures within the normal range of options envisaged by a person skilled in this art.
- Claims **11-12**. The use of place name and road name information is disclosed in **D3** (page **15**, lines **10-18**)
  - Claims **13, 15, 18**. The use of the wireless application protocol to request and transmit information on the location of the mobile, does not imply any new technical effect, involving only the normal use of that protocol. This protocol would be chosen by the skilled person, in accordance with circumstances, without the exercise of inventive skill.
  - Claim **14**. The means for accepting the request from a second mobile unit, are disclosed in **D2** (see figure **1**, (**10**) and (**50**))
  - Claims **17-19**. The features of these claims are considered to be design options, that can be implemented by the skilled person without the exercise of inventive skill.
6. The solution proposed in claim **20** of the present application cannot be considered novel (Article 33(2) PCT) for the following reasons:

All the steps of the method in claim 20 are disclosed in D2 (see abstract, lines 1-4, and figure 1).

7. Dependent claims 21-23 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of novelty and inventive step. They are either known from the prior art or they are considered to be common design measures within the normal range of options envisaged by a person skilled in this art.

The use of the wireless application protocol to request and report information on the location of the mobile, does not imply any new technical effect, involving only the normal use of that protocol. This protocol would be chosen by the skilled person, in accordance with circumstances, without the exercise of inventive skill. The use of the WTA server, gateway mobile location centre and location information server are only normal design options for retrieving the mobility related information, that can be implemented by the skilled person without the exercise of inventive skill.

**Re Item VII**

**Certain defects in the international application**

1. Independent claims 1, 8, 10, 16 and 20 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
3. To meet the requirements of Rule 5.1 a) ii) PCT, the documents D1- D4 should be identified in the description and the relevant background art disclosed therein

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/IB99/02076

should be briefly discussed.

**Re Item VIII**

**Certain observations on the international application**

1. The following terms used throughout the claims are vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer (Article 6 PCT):
  - a) The term "descriptive information" of claim 10, should be further defined, for example, making reference to "geographical information".
  - b) The term "WTA" of claim 22 should be further defined.

**CLAIMS**

1. A method for estimating the location of a mobile unit in a cellular radio system, said system comprising elongate cells and non-elongate cells, and said method comprising:

Identifying a cell of the system in which the mobile unit is located;

determining whether the cell is elongate or non-elongate;

determining the location of the base-station;

if the cell is non-elongate, estimating the location of the mobile unit to be the location of the base station of the cell; or

if the cell is elongate, estimating the distance of the mobile unit from the base-station of the cell, determining bearing information associated with the cell, the bearing information defining a direction, and estimating the location of the mobile unit by calculating a location offset from the base-station by the said distance in the said direction.

2. A method as claimed in claim 1, wherein the bearing information is independent of the location of the mobile unit within the cell.

3. A method as claimed in claim 1 or 2, wherein the distance of the mobile unit from the base-station is estimated by means of synchronisation information of the cellular radio system.

4. A method as claimed in claim 3, wherein the synchronisation information represents a timing offset between the mobile station and the base-station.

5. A method as claimed in any preceding claim, comprising the step of sending a message to the mobile station in dependence on the estimated location.

6. A method as claimed in any preceding claim, comprising the step of receiving a message from the mobile requesting estimation of its location.



7. A method as claimed in any preceding claim, comprising the steps of receiving information defining a location; and calculating a route between that location and the estimated location of the mobile station.

8. A locating unit for estimating the location of a mobile unit in a cellular radio system, the unit being connected to the cellular radio system for reception of information identifying a cell of the system in which the mobile unit is located and information indicative of the distance of the mobile unit from the base-station of the cell, said system comprising elongate and non-elongate cells, said locating unit comprising:

data storage means storing the location of the base-station and, if the cell is elongate, bearing information associated with the cell, the bearing information defining a direction; and

location calculation means for, if the said cell is non-elongate, calculating the location of the base-station as an estimate of the location the mobile unit, and if the said cell is elongate, calculating the distance of the mobile unit from the base-station of the cell and calculating a location offset from the base-station by the said distance in the said direction as an estimate of the location of the mobile unit.

9. A unit as claimed in claim 8, comprising messaging means for generating a message in dependence on the estimated location for transmission to the mobile unit.

10. A locating unit for reporting the location of a mobile unit in a cellular radio system, the unit being connected to the cellular radio system for reception of information identifying a cell of the system in which the mobile unit is located and information indicative of the distance of the mobile unit from the base-station of the cell, the locating unit comprising:

data storage means storing descriptive information associated with one or more possible distances of a mobile unit from the base-station of the cell; and

location reporting means for generating a report on the location of the mobile unit based on the descriptive information that corresponds to the distance of the mobile unit from the base-station of the cell.

11. A unit as claimed in claim 10, wherein the descriptive information comprises place name information.

12. A unit as claimed in claim 10 or 11, wherein the descriptive information comprises road name information.

13. A unit as claimed in any of claims 10 to 12, wherein the location reporting means comprises a wireless application protocol server.

14. A unit as claimed in claim 13, wherein the location reporting means comprises means for accepting a request for information on the location of the said mobile unit from a second mobile unit from a second mobile unit.

15. A unit as claimed in claim 14, wherein the said request is made by means of the wireless application protocol.

16. Locating apparatus for reporting the location of a mobile unit in a mobile telecommunication system including positioning means for determining the geographic location of a mobile unit in response to a request including information identifying that mobile unit, the locating apparatus comprising:

location request means for requesting the geographic location of a mobile station from the positioning means;

geographic location translation means for receiving the geographic location of the mobile unit from the positioning means and translating the said geographic location into descriptive information; and

location response means for generating a response message comprising the said descriptive information.

17. Locating apparatus as claimed in claim 16, wherein the locating apparatus is capable of providing a content service to respond with the said descriptive information.

18. Locating apparatus as claimed in claim 17, wherein the said service is a wireless application protocol service.

19. Locating apparatus as claimed in any of claims 16 to 18, wherein the said positioning means is a mobile location centre.

20. A method for providing a report on the location of a first mobile station, the method comprising:

- a second mobile station transmitting a request for information on the location of the first mobile station;

- estimating the location of the first mobile station;

- generating a report on the location of the first mobile station; and

- transmitting that report to the second mobile station;

wherein the request and/or the report are transmitted by means of the wireless application protocol.

21. A method as claimed in claim 20, wherein the report is generated by a wireless application protocol server.

22. A method as claimed in claim 20 or 21, wherein the said request is made to a gateway mobile location centre by way of a WTA server.

23. A method as claimed in any of claims 20 to 22, wherein the said report is generated based on information from a gateway mobile location centre and from a location information server.

From the INTERNATIONAL SEARCHING AUTHORITY

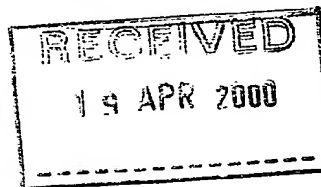
PCT

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL SEARCH REPORT  
OR THE DECLARATION

(PCT Rule 44.1)

To:

PAGE WHITE & FARRER  
Attn. Slingsby, Philip Roy  
54 Doughty Street  
LONDON WC1N 2LS  
UNITED KINGDOM



Date of mailing (day/month/year)	17/04/2000
Applicant's or agent's file reference 101009/PRS	<b>FOR FURTHER ACTION</b> See paragraphs 1 and 4 below
International application No. PCT/IB 99/ 02076	International filing date (day/month/year) 13/12/1999
Applicant NOKIA NETWORKS OY et al.	

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

**Filing of amendments and statement under Article 19:**

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

**When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

**Where?** Directly to the International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland  
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Eric Walsh

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

## INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

### What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

### When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

### Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

### How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

### What documents must/may accompany the amendments?

#### Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:  
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:  
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:  
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or  
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:  
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

**"Statement under article 19(1)" (Rule 46.4)**

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

**It must be in the language in which the international application is to be published.**

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

**Consequence if a demand for international preliminary examination has already been filed**

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

**Consequence with regard to translation of the international application for entry into the national phase**

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>101009/PRS</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/IB 99/ 02076</b>	International filing date (day/month/year) <b>13/12/1999</b>	(Earliest) Priority Date (day/month/year) <b>14/12/1998</b>
Applicant <b>NOKIA NETWORKS OY et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

**4. With regard to the title,**

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

**5. With regard to the abstract,**

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

**6. The figure of the drawings to be published with the abstract is Figure No.**

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

3

☐ None of the figures.



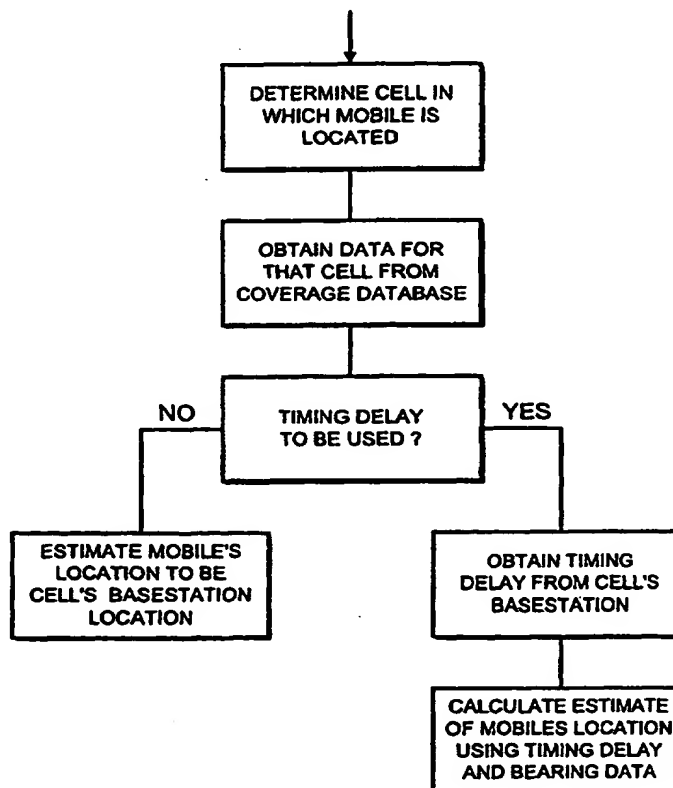
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>7</sup> : <b>G01S 5/02, 5/12</b>		A1	(11) International Publication Number: <b>WO 00/36430</b>
			(43) International Publication Date: 22 June 2000 (22.06.00)
(21) International Application Number: PCT/IB99/02076 (22) International Filing Date: 13 December 1999 (13.12.99) (30) Priority Data: 9827505.0      14 December 1998 (14.12.98)    GB 9927207.2      17 November 1999 (17.11.99)    GB (71) Applicant (for all designated States except US): NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI). (72) Inventors; and (75) Inventors/Applicants (for US only): STAACK, Jens [FI/FI]; Klancettitie 12 D 54, FIN-00420 Helsinki (FI). SIVALINGAM, Kengatharan [FI/FI]; Ulvilantie 8 C 34, FIN-00350 Helsinki (FI). TUHKALAINEN, Timo [FI/FI]; Jokitie 20 A 2, FIN-00780 Helsinki (FI). (74) Agents: SLINGSBY, Philip, Roy et al.; Page White & Farrer, 54 Doughty Street, London WC1N 2LS (GB).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	

(54) Title: LOCATING SYSTEM FOR MOBILE STATIONS

## (57) Abstract

A method for estimating the location of a mobile unit in a cellular radio system, comprising: identifying a cell of the system in which the mobile unit is located; estimating the distance of the mobile unit from the base-station of the cell; determining the location of the base-station; determining bearing information associated with the cell, the bearing information defining a direction; and calculating a location offset from the base-station by the said distance in the said direction to estimate the location of the mobile unit.





**FOR THE PURPOSES OF INFORMATION ONLY**

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EE	Estonia						

**LOCATING SYSTEM FOR MOBILE STATIONS**

This invention relates to a system for estimating the locations of mobile stations in a cellular radio system. For example, the mobile stations could be mobile telephones in a cellular telephone system.

Figure 1 is a simplified schematic diagram of the radio coverage in an area of a cellular radio network. A number of base-stations 1 to 9 are distributed over the area. Each base-station has one or more base-station transceivers which can transmit and receive radio signals to and from mobile stations. Each base-station transceiver transmits to and receives from a limited area, which represents the cell associated with that base-station transceiver. Figure 1 shows cells 10-19. When a mobile station is in a cell it communicates with the base-station transceiver associated with that cell. As shown in Figure 1, the cells vary in size and shape depending on factors such as the directionality, transmit power and receive sensitivity of the base-station transceiver, and the topography around the base-station. For example, cells 10 and 11 are relatively large and surround their respective base-stations 1 and 2 generally evenly - these represent typical cells in a rural area; cells 12 and 13 are elongate and extend in opposite directions along a main road 22 from a single base-station 3; cells 14-18 are very small - these are typical cells in an urban area.

In a typical cellular radio system the transmissions of each mobile station must be synchronised with the timing of its current base-station. As the mobile moves closer to the base-station its transmissions take less time to reach the base-station; therefore, to maintain synchronisation, it delays its transmissions increasingly (under command from the base-station) as it approaches the base-station. For example, in the GSM cellular telephone system once a connection has been established between a base-station and a mobile station the base-station continually measures the time offset between its own clock and the timing of the signals received from the mobile station. Based on these measurements it calculates a timing advance from 0

to 233  $\mu$ s, coded as a number from 0 to 63 which it transmits regularly to the mobile station. The base-station therefore knows the timing advances (TAs) for all the active mobile stations in its cells.

Since the timing advance is largely determined by the speed of radio propagation (which is known) and the distance of the mobile from the base-station it might be expected that knowledge of the TAs could allow the system to estimate the geographical locations of the mobile stations. For example, where several cells overlap it might be expected that triangulation using the cells' TAs could permit estimation of a mobile's position. However, such schemes have met with many practical difficulties (such as coping with time delays caused by reflected signals) which have made the schemes too complex for widespread implementation.

There is thus a need for a more easily implemented system to allow the geographical location of a mobile station to be determined.

According to one aspect of the present invention there is provided a method for estimating the location of a mobile unit in a cellular radio system, comprising: identifying a cell of the system in which the mobile unit is located; estimating the distance of the mobile unit from the base-station of the cell; determining the location of the base-station; determining bearing information associated with the cell, the bearing information defining a direction; and calculating a location offset from the base-station by the said distance in the said direction to estimate the location of the mobile unit.

In one preferred arrangement the said cell is a cell of a first type and the method comprises the step of, if the mobile station is located in a cell of a second type, estimating the location of the mobile unit to be the location of the base-station of that cell of the second type. The first type of cell may be a cell of generally elongate coverage area. The second type of cell may be a cell of generally non-elongate coverage area.

Preferably the method comprises determining whether the cell in which the mobile unit is located is of the first type or the second type. This may be done on the basis of a stored indication of the type of each cell.

The bearing information is preferably independent of the location of the mobile unit within the cell. The bearing information preferably indicates a direction in which the coverage area of the cell is elongate.

The distance of the mobile unit from the base-station is suitably estimated by means of synchronisation information of the cellular radio system. One example of such synchronisation information is timing advance information. Thus, the synchronisation information suitably represents a timing offset between the mobile station and the base-station.

Once the location has been estimated further action such as processing or sending of messages may be performed to utilise the location information. For example, a message may be sent to the mobile station in dependence on the estimated location. Such a message suitably indicates the estimated location and/or indicates the result of processing based on the estimated location. Such a message may be sent by, for instance, a voice format or a data format such as a text message format. One example of such processing is the calculation of a route between a certain location and the estimated location of the mobile station. That certain location may be received from the mobile itself, for example if the user of the mobile has initiated the calculation of a route to that location.

The estimation of the mobile's location is suitably initiated by a message from the mobile requesting estimation of its location and/or by the elapse of a predetermined time from an event such as the last estimation of the mobile's location.

According to a second aspect of the present invention there is provided a locating unit for estimating the location of a mobile unit in a cellular radio system, the unit being connected to the cellular radio system for reception of information identifying a cell of the system in which the mobile unit is located and information indicative of the distance of the mobile unit from the base-station of the cell, the locating unit comprising: data storage means storing the location of the base-station and bearing information associated with the cell, the bearing information defining a direction; and location calculating means for calculating a location offset from the base-station by the said distance in the said direction as an estimate of the location of the mobile unit.

The data storage means suitably stores cell type information associated with the cell, the cell type information indicating whether the bearing information is to be used in estimating the location of a mobile unit in the cell.

The unit may also comprise logic means for, in dependence on the cell type information, causing the location calculating means either: if the said cell is a cell of a first type, to calculate a location offset from the base-station by the said distance in the said direction as an estimate of the location of the mobile unit; or if the said cell is a cell of a second type, to take the location of the base-station as an estimate of the location of the mobile unit. The unit may also comprise messaging means for generating a message in dependence on the estimated location for transmission to the mobile unit.

According to a third aspect of the present invention there is provided a locating unit for reporting the location of a mobile unit in a cellular radio system, the unit being connected to the cellular radio system for reception of information identifying a cell of the system in which the mobile unit is located and information indicative of the distance of the mobile unit from the base-station of the cell, the locating unit comprising: data storage means storing descriptive information associated with one or more possible distances of a

mobile unit from the base-station of the cell; and location reporting means for generating a report on the location of the mobile unit based on the descriptive information that corresponds to the distance of the mobile unit from the base-station of the cell.

The descriptive information may suitably include place name information and/or road name information and/or distance information. The location reporting means preferably transmits the report to the mobile unit.

The location reporting means may comprise a wireless application protocol (WAP) server or a WTA server of WAP which has a secure connection to a WAP gateway. The location reporting means may comprise means for accepting a request for information on the location of the said mobile unit from a second mobile unit. The said request may be made by means of the wireless application protocol.

According to a fourth aspect of the present invention there is provided locating apparatus for reporting the location of a mobile unit in a mobile telecommunication system including positioning means for determining the geographic location of a mobile unit in response to a request including information identifying that mobile unit, the locating apparatus comprising: location request means for requesting the geographic location of a mobile station from the positioning means; geographic location translation means for receiving the geographic location of the mobile unit from the positioning means and translating the said geographic location into descriptive information; and location response means for generating a response message comprising the said descriptive information.

Suitably the locating apparatus may be capable of providing a content service to respond with the said descriptive information. That may be a wireless application protocol service. The said positioning means may be a mobile location centre.

According to a fifth aspect of the present invention there is provided a method for providing a report on the location of a first mobile station, the method comprising: a second mobile station transmitting a request for information on the location of the first mobile station; estimating the location of the first mobile station; generating a report on the location of the first mobile station; and transmitting that report to the second mobile station; wherein the request and/or the report are transmitted by means of the wireless application protocol. Suitably, the report may be generated by a wireless application protocol server. In addition to the WAP wireless session protocol the request and report may be transmitted using any content transfer protocol, for instance internet hypertext transfer protocol (HTTP).

In each aspect of the invention the mobile unit may, for example, be a radio telephone.

The present invention will now be described by way of example with reference to the accompanying drawings, in which:

figure 1 illustrates cell coverage in a cellular telephone system;

figure 2 shows a schematic diagram of a cellular telephone system;

figure 3 is a flow diagram of the procedure for locating a mobile station;

figure 4 is a schematic diagram of the environment of a cellular telephone system;

figures 5 and 6 show schematic diagrams of architectures for implementing a locating system in a GSM network; and

figure 7 shows a signalling scheme for requesting information on the position of a mobile station.

The system of figure 2 includes a mobile locating unit (MLU) 30 connected to base-stations 1 to 9 of figure 1 via mobile service centres (MSCs) 31 to 34. The MLU has access to information from the base-stations and data stored in a coverage database 35a and uses them to estimate the geographic location

of mobile stations 36,37 (e.g. cellular telephone handsets) in the system. The basic principle used to locate the mobile stations is as follows. The database 35a stores, for each cell, the geographic location of that cell's base-station and an indication of, when a mobile station is in that cell, whether or not the mobile station's timing advance should be used to estimate the mobile station's location. For the cells for which timing advance is to be used to estimate mobile station location the database also stores bearing data, which indicates the compass bearing from the cell location that mobiles in that cell will be assumed to lie on. Then to estimate the location of a mobile station the MLU determines via the MSCs which cell the mobile is currently in. The MLU consults the information on that cell that is stored in the database 35a. If the database indicates that timing advance (and bearing data) should not be used to estimate the locations of mobiles in that cell then the MLU estimates the mobile station's location to be the location of the base-station associated with that cell. If the database indicates that timing advance (and bearing data) should be used for locating mobiles in that cell then the MLU obtains from the database the bearing data for that cell and obtains from the base-station associated with that cell the mobile station's timing delay. The timing advance is converted to a distance using the known speed of propagation of the radio signals, and the location of the mobile station is estimated as being at a position offset from the base-station by that distance in the direction defined by the bearing information.

The process is illustrated by the flow diagram in figure 3.

The indication of whether the timing delay / bearing data is to be used for any base-station could be stored separately from the bearing data itself, or a special value of the bearing data for a base-station (e.g. 400°) could be used to indicated that the timing delay / bearing data is not to be used for that base-station.



The process of estimating the mobile's location could be initiated by the sending of a message from the mobile to the MLU over the radio system.

The cells for which the database defines that the TA should be used in locating are elongate cells (such as cells 12 and 13 in figure 1), for which the corresponding bearing data defines the compass bearing along which the elongation of the cell extends from the associated base-station. The other cells are those for which the TA is not used in locating.

Therefore, referring to figure 1, if the mobile is in one of the cells 14 to 18 its location will be estimated to be the location of the respective base-station 5,8,9,7,6. Since these cells are small in area and centred on their respective base-station the estimate of location will be relatively accurate. If the mobile is in one of the cells 12,13 its location will be estimated using the TA to lie at a point along the major axis of the cell. Since these cells are narrow perpendicular to that axis the estimate of location will again be relatively accurate, subject to errors due to disproportionality of the TA with distance from the base-station caused by factors such as reflection of signals. If the mobile is in one of the cells 10,11,19 then its location will be approximated to be the location of the respective base-station 1,2,4. This is relatively inaccurate but since these are rural cells, in many networks a typical mobile will only rarely occupy such a cell. The present system therefore provides a greatly simplified method of locating mobiles, with relatively little loss in performance over much more complex systems.

The process of calculating an estimate of a mobile's location from its timing advance will now be described. Using a normal orthogonal geographical grid system the location of a base-station (e.g. base-station 3 in figure 1) can be indicated as co-ordinates  $x_b$ ,  $y_b$ , where  $x_b$  is a northing and  $y_b$  is an easting. The bearing data for the relevant cell can be indicated as  $\theta$  degrees from north and the mobiles' timing delay can be indicated as  $t$  seconds. Taking the speed of radio signals to be  $v = 3 \times 10^8$  ms<sup>-1</sup> the mobile's distance  $d$  from the base-station is estimated by:

$$d = v t$$

and the co-ordinates of the mobile's estimated location are  $x_m$ ,  $y_m$ , where:

$$x_m = x_b + d \cos \theta$$

$$y_m = y_b + d \sin \theta$$

Once the location of the mobile station has been determined the MLU can transmit that information to the mobile station or another unit. Some convenient ways for this to be done are by text or voice messages over the radio system. For instance, in a GSM system text messages could be sent by SMS (short message service) or USSD (unstructured supplementary services data).

The MLU (or another unit having received the location information) could perform further processing based on the location information together, optionally, with other information such as information derived from a geographical database 35b. The geographical database could, for example, store the locations of geographical features such as towns and roads: one example of such a database is the Finnish Genimap system. Examples of the further processing that is possible are as follows:

1. The MLU could determine the location of the mobile relative to geographical features in the database and generate a message to report the location relative to those features, such as "you are in town X" or "you are between towns X and Y" or "you are 5km from town X on road Z".

2. If the MLU is capable of receiving messages from a user of the mobile (e.g. by the SMS system) the user could, by means of a message, request the MLU to use its database to perform a calculation and report the result by a message. For example, the user could request the MLU to suggest a route from the mobile's location to a specified location, or to calculate the distance from the mobile's location to a specified location. The MLU could also suggest a route from the mobile's current location to a present location such as the mobile user's home. The mobile user's home location could be determined by the MLU from information available from the radio network's billing centre or subscriber database. Using estimates of driving speeds and travel costs the MLU could report estimated journey times and costs for suggested routes.
3. The MLU could (e.g. following a request by the user) send messages periodically (e.g. every 15 minutes) to report the mobile's location.

Figure 4 illustrates a specific example of location estimations. Figure 4 shows the A616 road extending between the towns of Olvila and Kosula and covered by an elongate radio cell from a base-station 38. The base-station measures and calculates the timing advance for the mobile station and gets the value 21. This value 21 corresponds to a distance of 8km from the base-station 37 at Turpela. So the location of the mobile station is 12km (4km + 8km) from Olvila, and 13km (21km - 8km) from Kosula. By monitoring the mobile's location over time the direction of movement of the mobile along the road/cell can be determined.

If the user asks to know the distance to some far away place, for example Hauho, we need to compare the distance from Hauho to Olvila and from Hauho to Kosula. The shorter way (= Kosula - Hauho plus 12km) will be informed to the user and it will also be used for route assistance. The mobile station user could get a message "you are in Aavasaksa (A616), 12km from Olvila and 13km from Kosula, you have 583km to go to Hauho, Do you want route assistance?" To simplify the integration of the coverage database 35a with the geographic database 35b the locations of base-stations could be approximated to geographic locations already held in the geographic database. Alternatively, the two databases could use a common geographical grid system or the MLU could translate between different grid systems

used by the databases. In some cases supplementary locations could be added to the geographic database, also to assist in calculating routes and distances.

Another alternative avoids the need for the storage of bearing information. One of the databases could store a list of descriptive information to each or to a range of timing advances. Once the location of a mobile station had been determined a description of the mobile station's location based on that descriptive information could be reported to a user. In the example of figure 4, the table could hold the following information:

Timing Advance	Place	City 1	City 2	Road
0 to 7	Turpela	Olvila	Kosula	A616
8 to 16	Jankhala	Olvila	Kosula	A616
17 to 22	Aavasaksa	Olvila	Kosula	A616
23 to 35	Perala	Olvila	Kosula	A616
over 35	Kosula	Kosula	Kosula	A616

City 1 and city 2 are major places between which the mobile station's location lies.

Examples of descriptions based on this information that could be reported to a user at timing advance 10 are:

"You are in Jankhala on the A616"

or (by calculation of the distance corresponding to a certain timing advance and knowledge of the distance of the base station from city 1 and city 2):

"You are in Jankhala (A616) 9 kilometres from Olvila and 16 kilometres from Kosula".

For non-linear cells, or in general cells for which the distance of the mobile unit from the base station is not to be taken into account in generating a report of the mobile station's location, the corresponding table could hold merely a single set of location data describing, for example, the central point of the cell.

Figures 5 and 6 show some schematic architectures for implementing this system in a GSM cellular telephone network. Like reference numbers refer to like units in these

figures and figure 2. In figure 5 the MLU 30 is connected to the network via a messaging unit 39 that allows bi-directional SMS or USSD message traffic between the MLU 30 and mobile 36. In figure 6 there is also a messaging platform 41 that acts as a gateway between the messaging unit 39 and a network 40, such as the internet, via which the MLU 30 is connected to the cellular network.

It will be appreciated that the present invention is especially advantageous in connection with in-vehicle mobile cellular radio mobile units. The mobile unit could be a mobile telephone or another mobile communication unit. The cellular network could be a cellular telephone network.

The invention may also be implemented with the proposed GPRS (general packet radio service). The proposed GPRS standards define support for a short message service centre and the GPRS radio interface also makes use of calculated/measured timing advances. The high data rates (40-100kb/s) available through GPRS could allow for more convenient use of data-intensive functionality. For example, having estimated the location of a mobile station the MLU could transmit information to the mobile station to allow it to display a map of its surroundings. Of course, such a feature could be implemented, albeit less conveniently, in systems having lower data rates. In the GPRS system messages to or from the mobile unit and/or the MLU could be sent via the SGSN (serving GPRS support node) or the MSC (mobile switching centre).

Signal strength information may be used either instead of or in combination with the timing advance information to estimate the distance of the mobile from the base-station.

When a person makes a telephone call to a mobile telephone one of the first things that he often asks the user of the mobile station is the location of that user. It would be useful for there to be a procedure whereby this information could be exchanged automatically. Figure 7 illustrates a signalling scheme whereby one mobile station may request and receive information on the location of another mobile station. In connection with this signalling method the location of the latter mobile station may be determined in accordance with the procedures described above or in another way,

and could be in accordance with GSM 03.71. The unit requesting the location information may be a mobile station or another unit capable of the necessary signalling.

The signalling scheme illustrated in figure 7 involves a request by a mobile station MS1 (illustrated at 50) for information on the location of another mobile station MS2. MS1 is operable according to the WAP (wireless access protocol) and has a WAP user agent 51 and a WAP repository 52. Also illustrated in figure 7 are a WAP gateway 53, a WTA server 54 and a mobile network 55 in which the mobile station MS2 is operable. The WTA server has access to a location information server 56, and the mobile network includes an MLC (mobile location centre) 57 which could be in accordance with GSM 03.71. The mobile location centre 57 provides a service for determining the location of MS2, and preferably also stores the last known location of MS2. The location information server 56 includes a geographical database of verbal descriptions of locations, whereby a descriptive phrase may be generated in response to location information as provided from the location information server. The verbal descriptions may be supplemented or replaced by graphical pictures comprising a map. In that case the geographical database may include a map database performing mapping from location information to map extracts.

The operation of the signalling scheme of figure 7 is as follows. The WAP user agent 51 makes a request for the URL (uniform resource locator) of the location description service. The URL specifies a WAP deck to interface to the location information service. The user of MS1 inputs the identity of MS2, which can for example be the MSISDN of MS2. The WAP deck issues a request for a URL for the same location description service; this time the URL including the identity of MS2. MS1 sends the request to the WAP gateway 53, which forwards that request to the WTA server 54. The WTA server extracts the identity of MS2 from the URL.

Thereafter, the WTA server contacts a GMLC (gateway mobile location centre). The GMLC contacts the HLR of MS2 (not shown in figure 7) in order to determine which network and visitor MSC/VLR MS2 is currently operating in. The GMLC then requests the position of MS2 from the visitor MSC/VLR. The visitor MSC/VLR determines the location of MS2 and returns the result to the GMLC. The GMLC

returns the result to the WTA server. The result may, for instance be given in co-ordinate form or as the identity of the cell in which MS2 lies. The WTA then consults location information server 56 in order to establish a description of that location – for example a place name or a street name. The WTA server returns that description to the WAP gateway, which transfers it back to MS1 to answer the position request from MS1. MS1 then displays the information to its user. The response could be transferred to MS1 as a response to the URL request containing the identity of MS2 or by WAP push, as an unstructured message or by another means. The WAP deck for the location description service may be available in the WAP repository when its URL is first requested, therefore its downloading from the WTA server may not be necessary.

The WTA server and the location information server may be seen as logical services. This means that they may be distributed to physical nodes in a number of different ways. For example, the WTA server and the location information server can be within the GMLC node.

For reasons of confidentiality it is preferred that a list of entities that are permitted to be given location information on a mobile station such as MS2 is stored. Such a list may be stored at the respective HLR. Thus, when the WTA contacts the HLR of MS2 the HLR may check that MS1 is permitted to receive location information about MS2 and otherwise causes the request from MS1 to be rejected. A WAP interface could be provided to allow a user to alter his list. The list may be part of location profile information. For this and other security reasons it is preferred that the WAP application is located at the WAP server.

The WTA server could store a list correlating user names and phone numbers or other identities (e.g. MSISDN). Alternatively the WTA server could be capable of consulting such a list stored elsewhere, for example at a global name server or HLR.

The GMLC could store the last known locations of mobile stations so that it can return the last known location of a mobile station if the mobile station is out of coverage (e.g. in a building) or switched off. The MLC could alternatively obtain that information from the appropriate VLR.

The present invention may include any feature or combination of features disclosed herein either implicitly or explicitly or any generalisation thereof, irrespective of whether it relates to the presently claimed invention. In view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the invention.



**CLAIMS**

1. A method for estimating the location of a mobile unit in a cellular radio system, comprising:
  - identifying a cell of the system in which the mobile unit is located;
  - estimating the distance of the mobile unit from the base-station of the cell;
  - determining the location of the base-station;
  - determining bearing information associated with the cell, the bearing information defining a direction; and
  - calculating a location offset from the base-station by the said distance in the said direction to estimate the location of the mobile unit.
2. A method as claimed in claim 1, wherein the said cell is a cell of a first type and the method comprises the step of, if the mobile station is located in a cell of a second type, estimating the location of the mobile unit to be the location of the base-station of that cell of the second type.
3. A method as claimed in claim 1 or 2, wherein the method comprises determining whether the cell in which the mobile unit is located is of the first type or the second type.
4. A method as claimed in any preceding claim, wherein the bearing information is independent of the location of the mobile unit within the cell.
5. A method as claimed in any preceding claim, wherein the distance of the mobile unit from the base-station is estimated by means of synchronisation information of the cellular radio system.
6. A method as claimed in claim 5, wherein the synchronisation information represents a timing offset between the mobile station and the base-station.
7. A method as claimed in any preceding claim, comprising the step of sending a message to the mobile station in dependence on the estimated location.

8. A method as claimed in any preceding claim, comprising the step of receiving a message from the mobile requesting estimation of its location.

9. A method as claimed in any preceding claim, comprising the steps of receiving information defining a location; and calculating a route between that location and the estimated location of the mobile station.

10. A locating unit for estimating the location of a mobile unit in a cellular radio system, the unit being connected to the cellular radio system for reception of information identifying a cell of the system in which the mobile unit is located and information indicative of the distance of the mobile unit from the base-station of the cell, the locating unit comprising:

data storage means storing the location of the base-station and bearing information associated with the cell, the bearing information defining a direction; and

location calculating means for calculating a location offset from the base-station by the said distance in the said direction as an estimate of the location of the mobile unit.

11. A unit as claimed in claim 10, wherein the data storage means stores cell type information associated with the cell, the cell type information indicating whether the bearing information is to be used in estimating the location of a mobile unit in the cell.

12. A unit as claimed in claim 11, comprising logic means for, in dependence on the cell type information, causing the location calculating means either:

if the said cell is a cell of a first type, to calculate a location offset from the base-station by the said distance in the said direction as an estimate of the location of the mobile unit; or

if the said cell is a cell of a second type, to take the location of the base-station as an estimate of the location of the mobile unit.

13. A unit as claimed in any of claims 10 to 12, comprising messaging means for generating a message in dependence on the estimated location for transmission to the mobile unit.

14. A locating unit for reporting the location of a mobile unit in a cellular radio system, the unit being connected to the cellular radio system for reception of information identifying a cell of the system in which the mobile unit is located and information indicative of the distance of the mobile unit from the base-station of the cell, the locating unit comprising:

data storage means storing descriptive information associated with one or more possible distances of a mobile unit from the base-station of the cell; and

location reporting means for generating a report on the location of the mobile unit based on the descriptive information that corresponds to the distance of the mobile unit from the base-station of the cell.

15. A unit as claimed in claim 14, wherein the descriptive information comprises place name information.

16. A unit as claimed in claim 14 or 15, wherein the descriptive information comprises road name information.

17. A unit as claimed in any of claims 14 to 16, wherein the location reporting means comprises a wireless application protocol server.

18. A unit as claimed in claim 17, wherein the location reporting means comprises means for accepting a request for information on the location of the said mobile unit from a second mobile unit from a second mobile unit.

19. A unit as claimed in claim 18, wherein the said request is made by means of the wireless application protocol.

20. Locating apparatus for reporting the location of a mobile unit in a mobile telecommunication system including positioning means for determining the geographic location of a mobile unit in response to a request including information identifying that mobile unit, the locating apparatus comprising:

location request means for requesting the geographic location of a mobile station from the positioning means;

geographic location translation means for receiving the geographic location of the mobile unit from the positioning means and translating the said geographic location into descriptive information; and

location response means for generating a response message comprising the said descriptive information.

21. Locating apparatus as claimed in claim 20, wherein the locating apparatus is capable of providing a content service to respond with the said descriptive information.

22. Locating apparatus as claimed in claim 21, wherein the said service is a wireless application protocol service.

23. Locating apparatus as claimed in any of claims 20 to 22, wherein the said positioning means is a mobile location centre.

24. A method for providing a report on the location of a first mobile station, the method comprising:

a second mobile station transmitting a request for information on the location of the first mobile station;

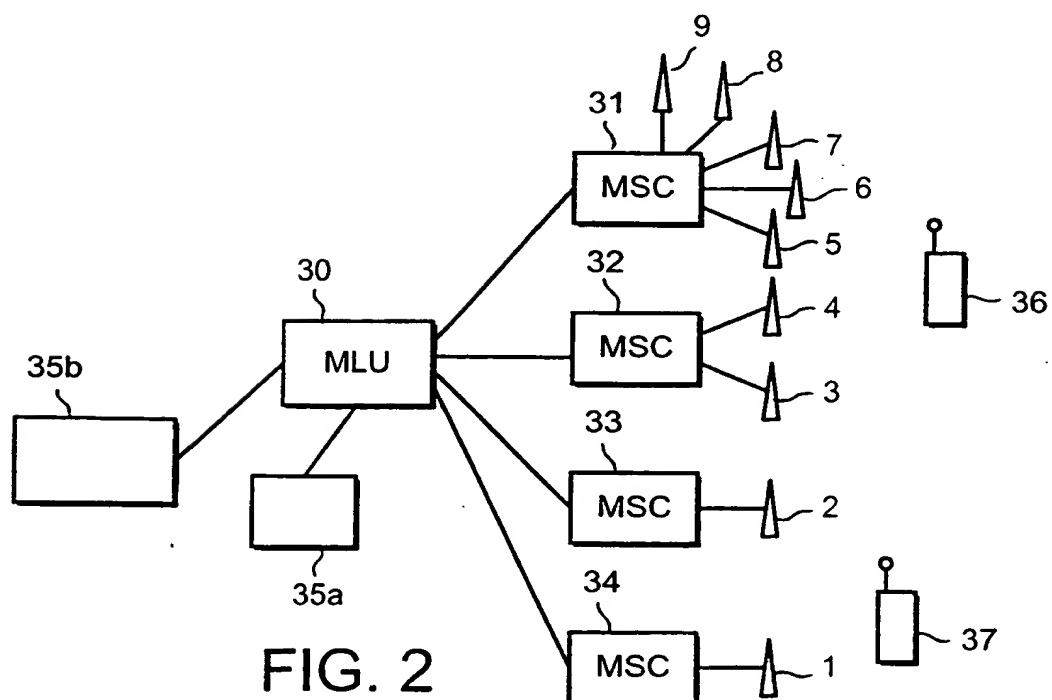
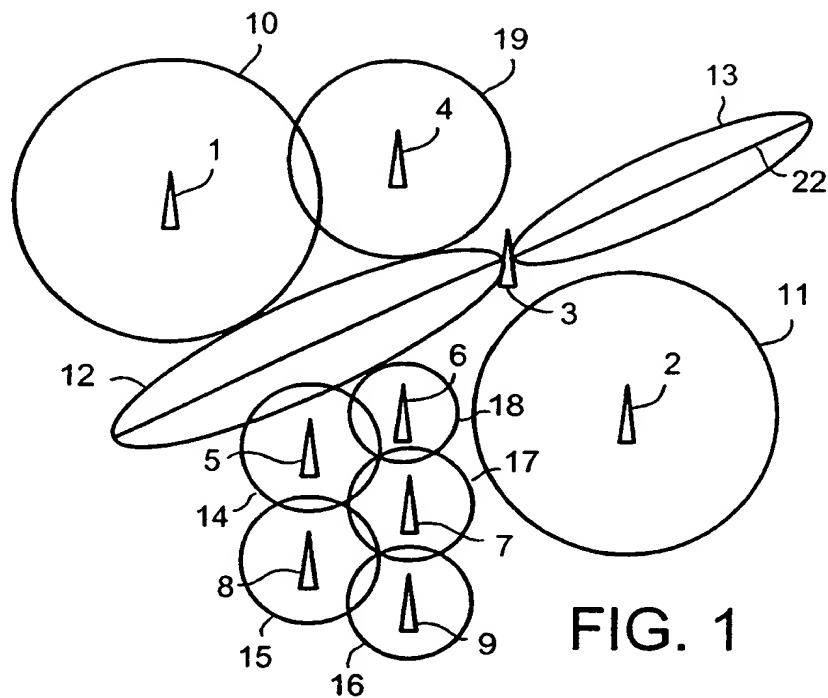
estimating the location of the first mobile station;

generating a report on the location of the first mobile station; and

transmitting that report to the second mobile station;

wherein the request and/or the report are transmitted by means of the wireless application protocol.

25. A method as claimed in claim 24, wherein the report is generated by a wireless application protocol server.



2 / 7

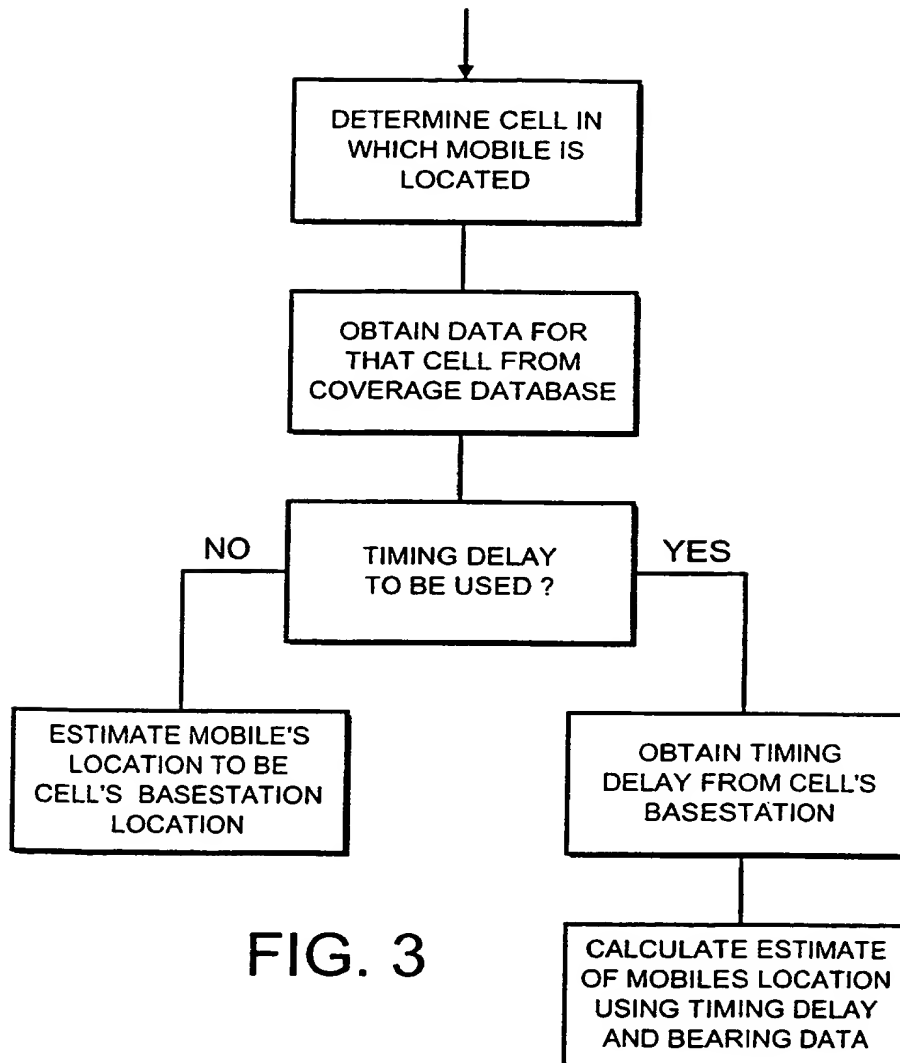
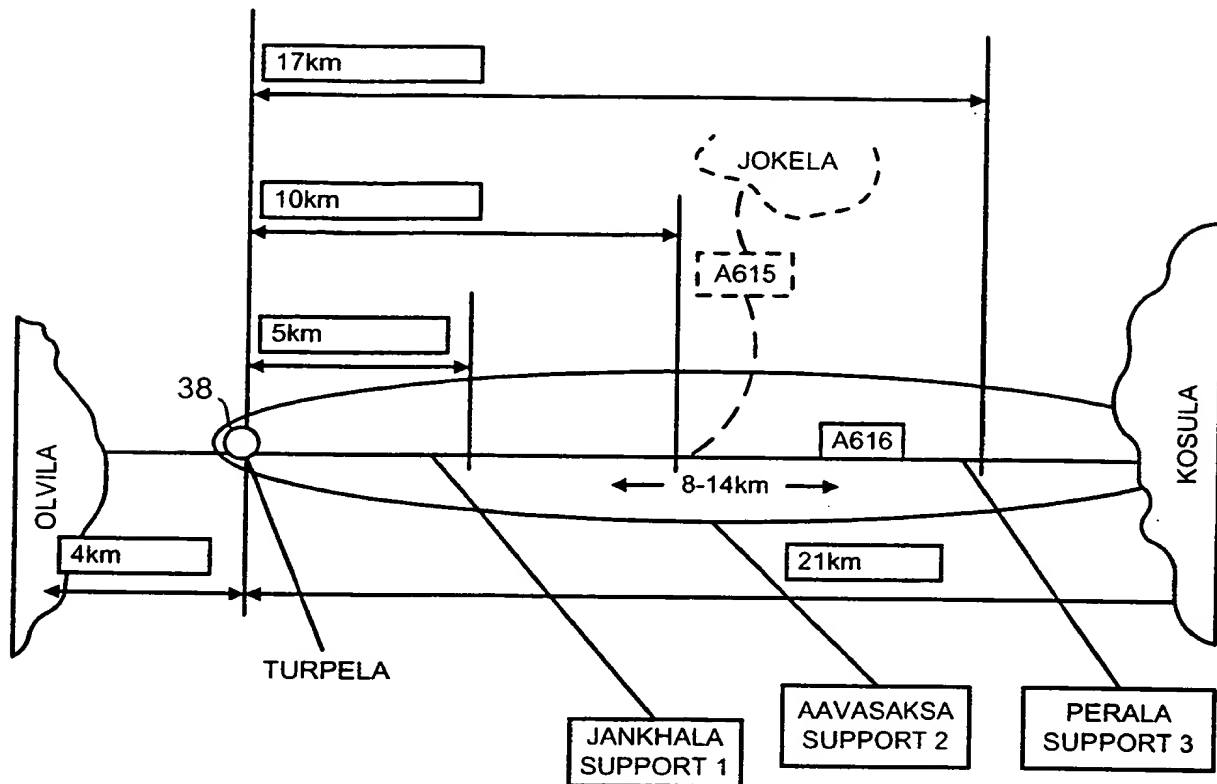


FIG. 3

3 / 7

FIG. 4



BASE STATION	TURPELA TA=0-8, 0-3kms
NEIGHBOUR 1	OLVILA 4km
NEIGHBOUR 2	KOSULA 21km
SUPPORT 1	JANKHALA TA=8-20, 3-8kms
SUPPORT 2	AAVASAKSA TA=21-32, 8-14kms
SUPPORT 3	PERALA TA=33-45, 14-19kms
ROAD	A616

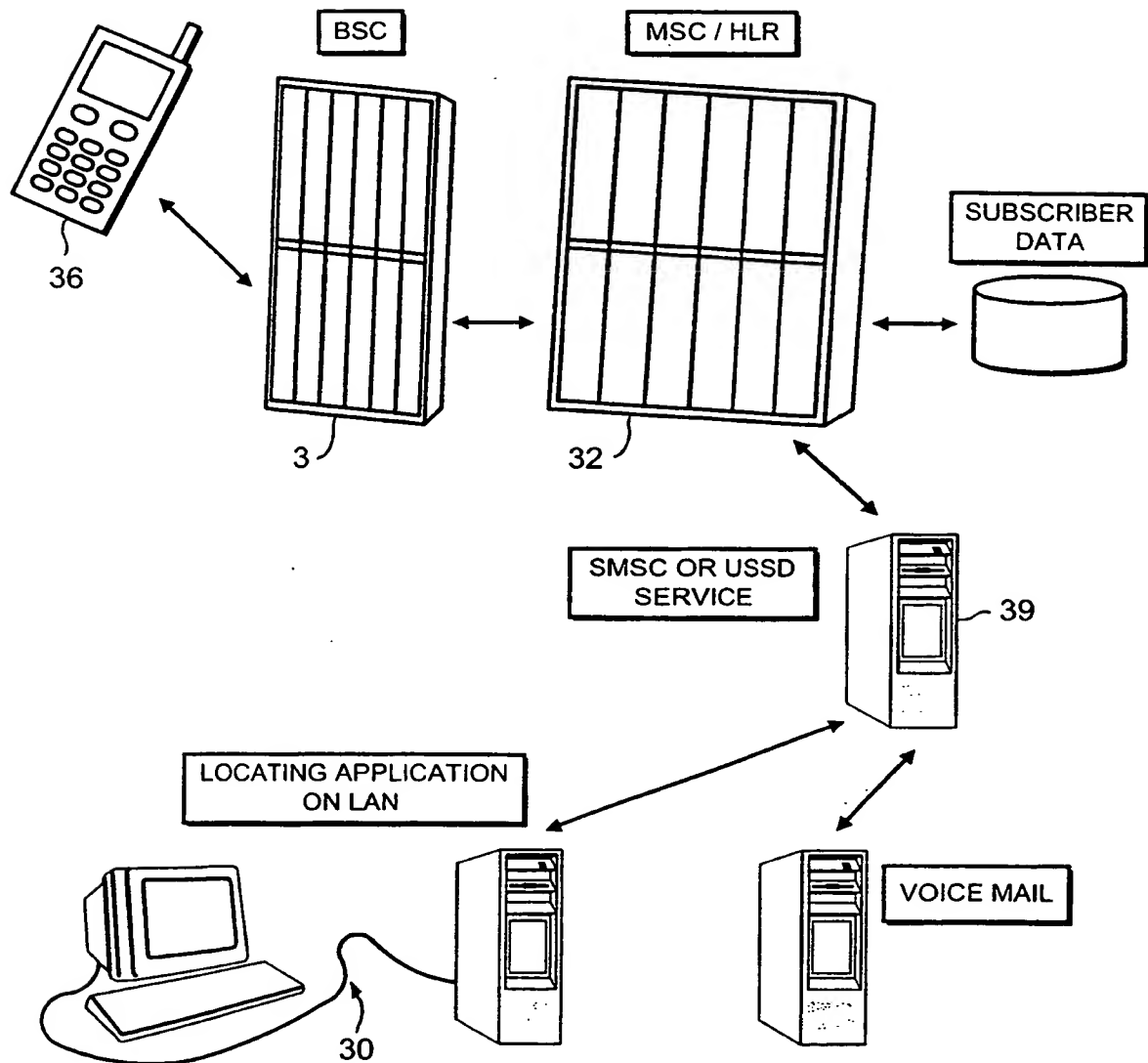
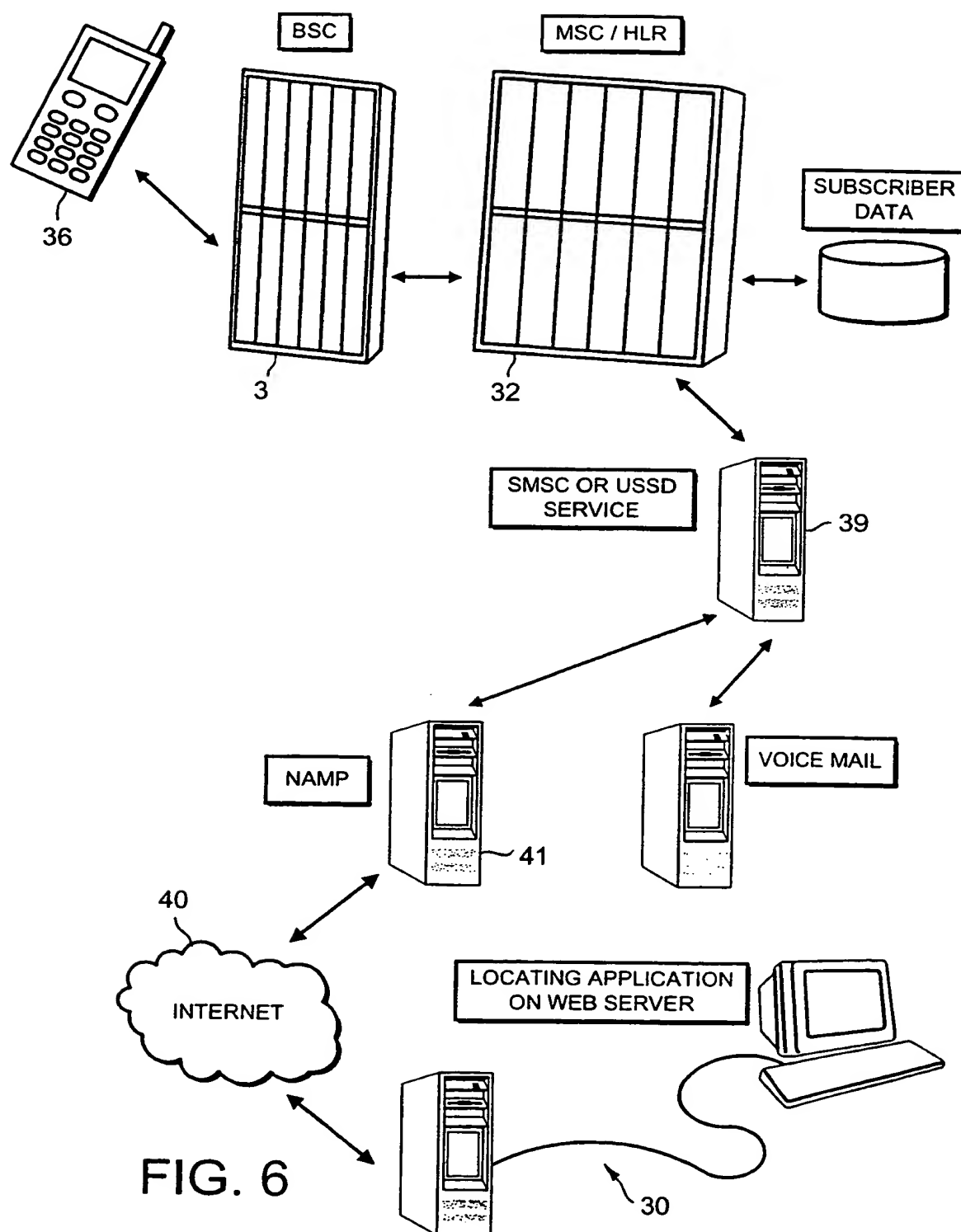
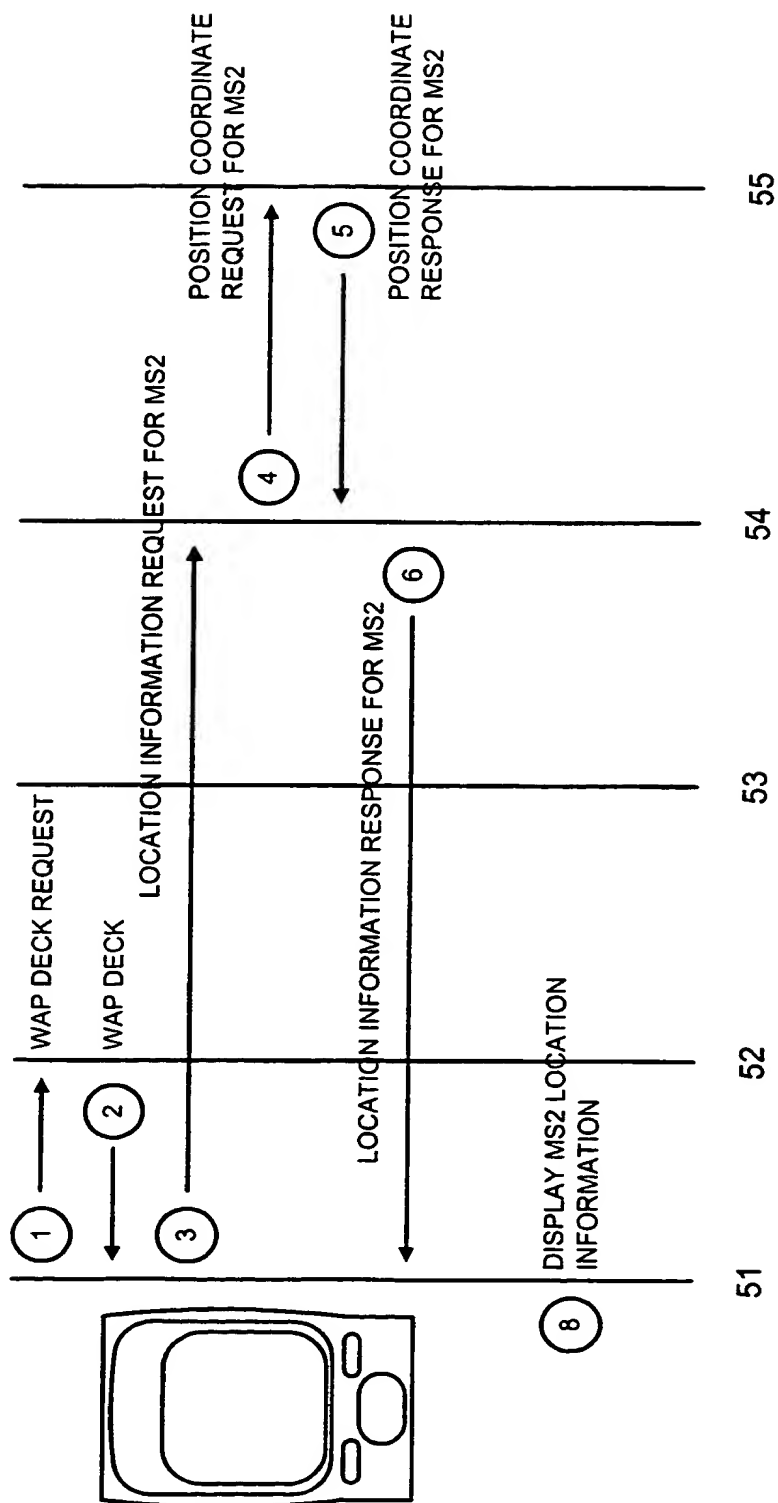
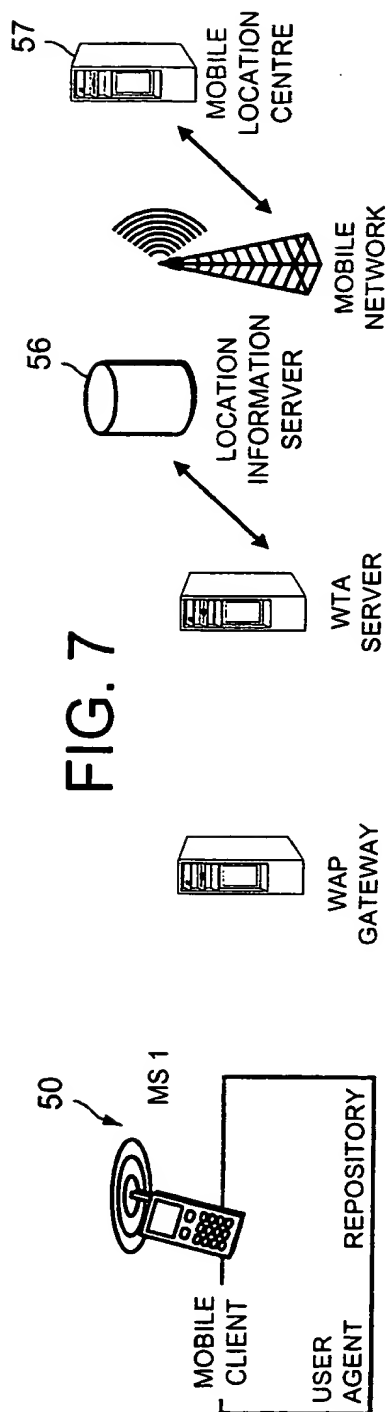


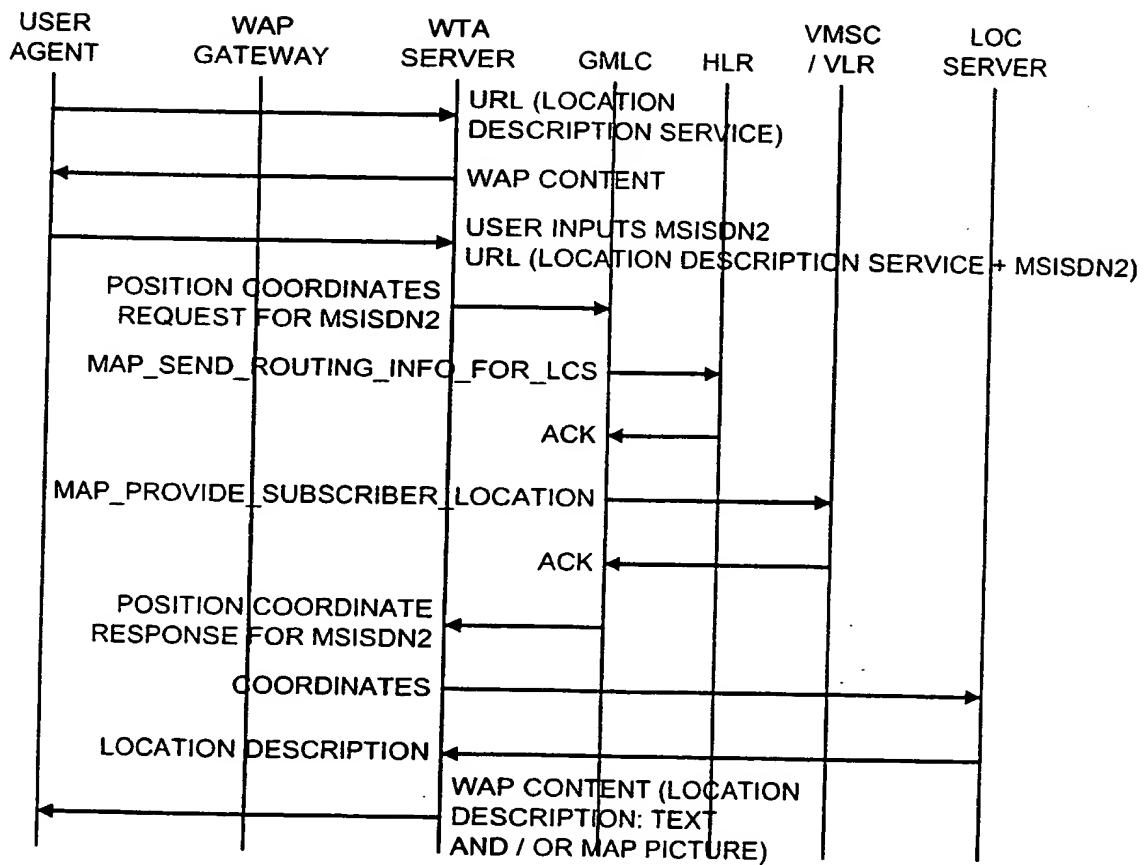
FIG. 5







7 / 7

FIG. 7<sub>CONT'D</sub>

# INTERNATIONAL SEARCH REPORT

In Application No  
PCT/IB 99/02076

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G01S5/02 G01S5/12

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01S H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	WO 97 17623 A (BORUNDI INTERNATIONAL PTY LTD) 15 May 1997 (1997-05-15) the whole document ---	1,4-7,9, 10,13 2,3
X	WO 92 02105 A (BRITISH TELECOMM) 6 February 1992 (1992-02-06) page 2, line 15 - line 17 page 3, line 28 - line 37 page 7, line 20 - line 27 ---	1,7
X Y A	WO 98 00988 A (ERICSSON GE MOBILE INC) 8 January 1998 (1998-01-08) abstract page 2, line 32 -page 3, line 32 * Summary of the Invention * page 16, line 3 - line 28 --- -/--	8,20,21, 23 22,24,25  2,3,11, 12

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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Date of the actual completion of the international search

10 April 2000

Date of mailing of the international search report

17/04/2000

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Application No

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